

## Functional state of the pancreas after the wedge-shaped resection of the duodenum and parapancreatic microirrigation

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### Introduction

It is known the development of acute pancreatitis (AP) is accompanied by increased secretory activity of the pancreas (pancreatic), hypertension in the pancreatic ducts and hyperenzymemia arising on the background of marked disorders of neurohumoral regulation of pancreatic secretion with the increased role of its stimulating component and perversion of exocrine pancreatic cell reactivity to secretatog.

Surgical trauma of duodenal ulcer (DU) leads to the breakdown of most of the known regulation mechanisms of pancreatic exosecretion, leading eventually to the pathological hyper RV, persistent increase its secretory activity and, in addition, to a violation of the outflow of pancreatic secretion.

It makes to search new ways to reduce the abnormal pancreatic hypersecretion in postoperative surgical duodenum trauma.

Widely used in the prevention of acute postoperative pancreatitis (APP) to inhibit prostate pathological hypersecretion were applied synthetic analog of 5-leytsinenkefalina (dalargin), which inhibits pancreatic exosecretion by an antagonistic relation with the pancreozymin in special receptors on the surface membranes of acinar cells and local anesthetics.

The result of this was to study the effect of these drugs on pancreatic exosecretion (PES) when administered locally to the parapancreatic tissue and to evaluate the clinical efficiency of this technique.

Purpose of examination is to study the influence of parapancreatic micro irrigation at pancreatic exosecretion, frequency of acute pancreatitis progress and transformation of enzyme blood serum activity and thoracic duct lymph after wedge resection of the duodenum.

### Materials and investigation technique

The examination was performed on 140 random bred dogs of mature age, divided into six groups and united in the two series. In the first series (30 dogs) were examining changes in pancreatic exosecretion postoperative wedge resection of the duodenal wall. (group 1.1), after wedge resection of the duodenal wall with pre-infiltration of 0.5% solution of novocaine (group 1.2) and after wedge resection of the duodenal wall, made during treatment parapancreas microirrigation (group 1.3). In the second series (110 dogs) were studied the incidence of acute pancreatitis, the enzymatic activity of blood serum and thoracic duct lymph (HL) after wedge resection of the duodenal wall (group 2.1), after wedge resection of the duodenal wall with pre-infiltration of 0.5% solution of novocaine (group 2.2) and after wedge resection of the duodenal wall, made during treatment of parapancreas mikroirrigation (group 2.3).

Surgical trauma was applied by KDP wedge excision antimesenteric edge of duodenal wall. Wound KDP was sutured by single sero-muscular-submucous nodular seam.

The main pancreatic duct after dissection was cannulated laterally graded by polypropylene catheter. RV secretion was collecting by hourly portions. Volume of secretion was estimated, total proteolytic activity of pancreatic juice (by Northrop-Kunitz) was determined, protein (Lowry technique), amylase (amiloclastic technique), tributiraz activity (photometry on the hydrolysis of tributyrin emulsion), their hours production rates were calculated.

In order to study the incidence of AFP there were used morphometric techniques - measurement of cariocytoplasmic index (Func) and the index of polymorphonuclear cell infiltration (SIC) [1, 2]. The presence of the OP was stated in identifying Func <0.35 and / or index SIC - 0.16 cells/100 mkm/100 and more.

In addition, blood serum (SC) and lymph GLP amylase activity was determined (Karavey aminoclastic technique) and lipase (by Tietz with co-workers). OP stated the increase in amylolytic and lipolytic activity of CK and lymph GLP factor of 2 or more from initial level.

The novocaine introduction was carried out using a syringe under a capsule gland along its lower and upper surface as well as between the leaf of mesentery, colon, stomach, spleen, stomach and pancreas, spleen bundles totaling to 50 ml.

Performing parapancreas microirrigation with the syringe was administrated introduction of drug cocktail, the foundation of which was 6% solution of poliglyukin and also containing 40.0 mg of lidocaine and 1.0 mg of dalargin in the same anatomic area as the introduction of novocaine. The volume of the cocktail was 20 ml.

All of the studied parameters in the first hour were taken for equal to 100%, the subsequent figures are expressed as a percentage of the original. The values of quantitative traits were presented in the form of "Median (Interquartile Range)." In order to identify statistically significant differences between treatment groups were used non-parametric tests (U-Mann-Whitney, Wilcoxon test) at a significance level of  $p < 0,05$  [11]. The mathematical treatment of the results was performed by using the software package Windows Statistica 6.0 (StatSoft Inc., USA).

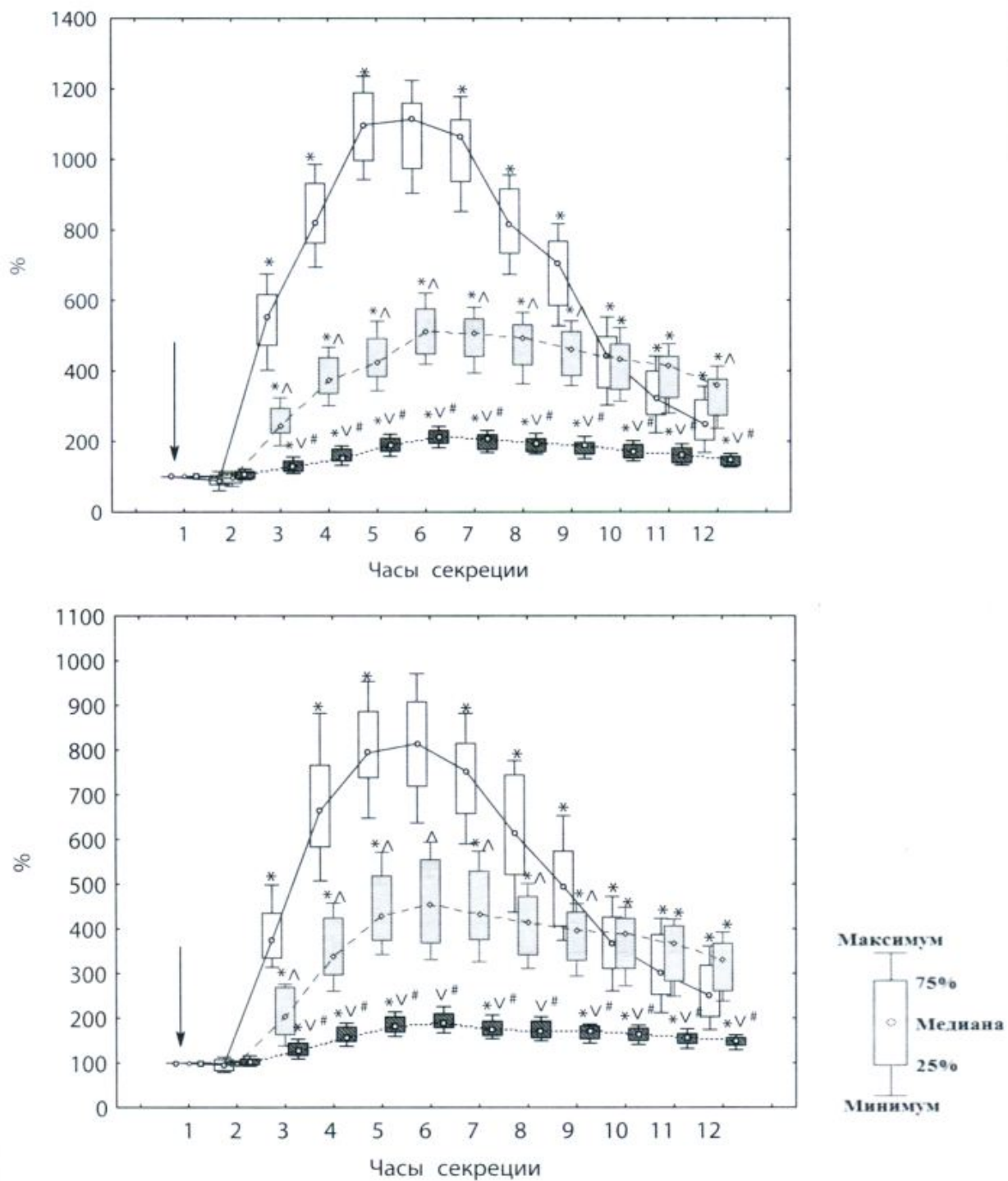
The experiments were undertaken and completed in accordance with the Declaration of Helsinki on humane treatment of laboratory animals [14]

## Investigation results and its discussion

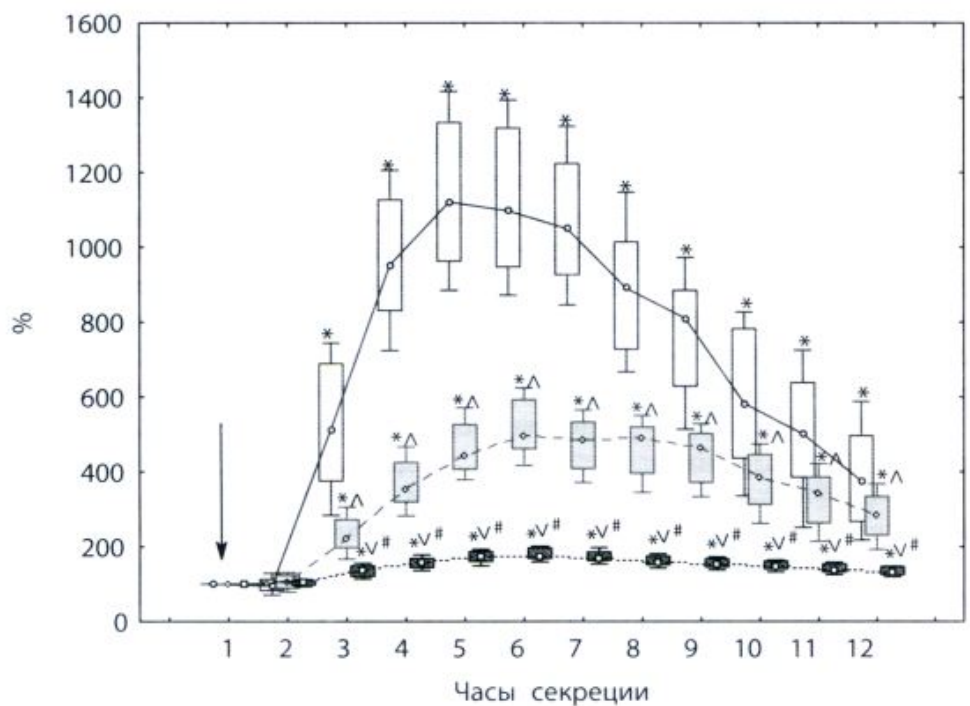
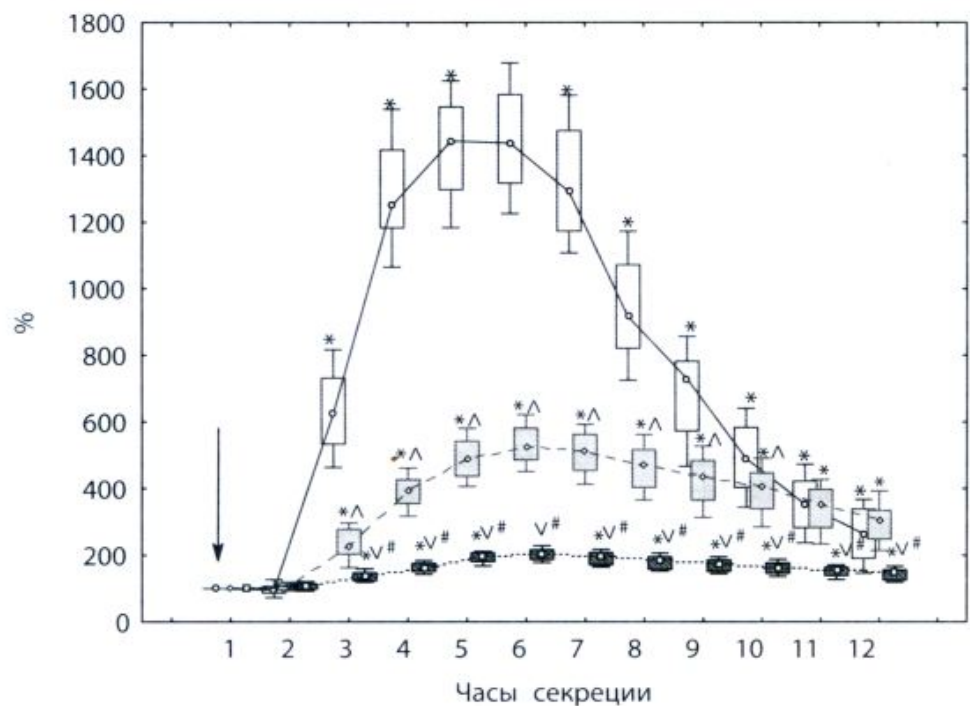
Operating injury PDK (1.1 group, the control group) caused a significant change in indicators of pancreatic exosecretion, which has had a three-phase character. An initial decrease in the volume of pancreatic secretion observed in the first hour after duodenotomy, it was replaced by a rapid increase until the fifth hour of observation and subsequent slow decline (Fig. 1).

After infiltration of tissue parapancreatic tissue by 0.5% solution of novocaine (group 1.2) was observed a decrease in the severity of depression of pancreatic secretion in the first hour after duodenotomy and further growth of the secret, starting with the second hour of the experiment.

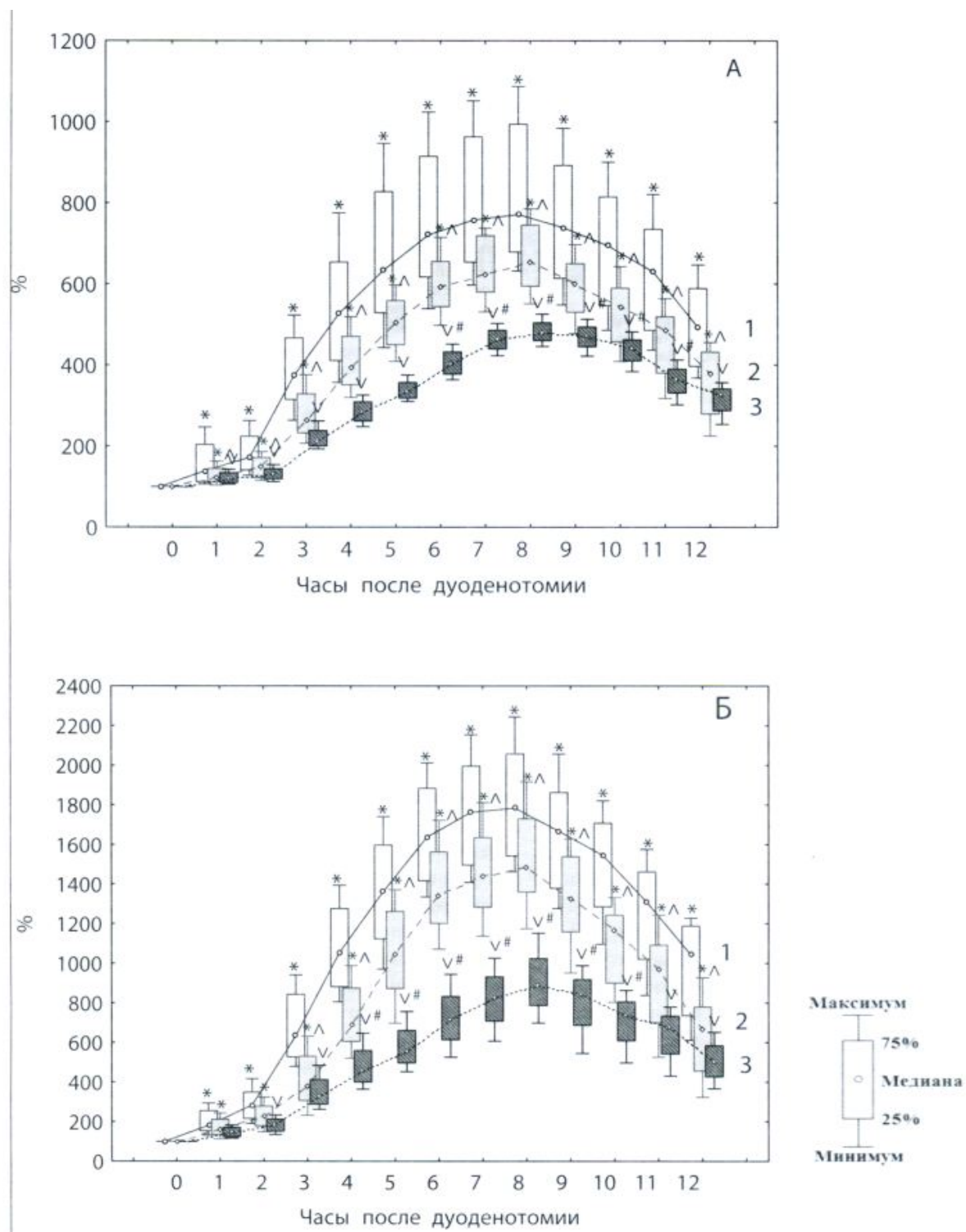
Increase in the pancreatic secretions, as well as in the group 1.1 was observed up to the fifth hour after duodenotomy with subsequent reduction (Fig. 1).



After application of MPG (group 1.3), there were no statistically significant decrease in volume of pancreatic secretions during the first hour after duodenotomy ( $p > 0,05$ ) and it was significantly increased ( $p < 0,01$ ) at least substantially throughout the observation period, compared with the control group and the 1.2 (Fig. 1). A similar dynamic was observed for flow rates of acinar secretion indicators (amylase, protein, protease, lipase), while maintaining the character of three-phase (Fig. 2, 3).



Максимум  
 75%  
 Медиана  
 25%  
 Минимум

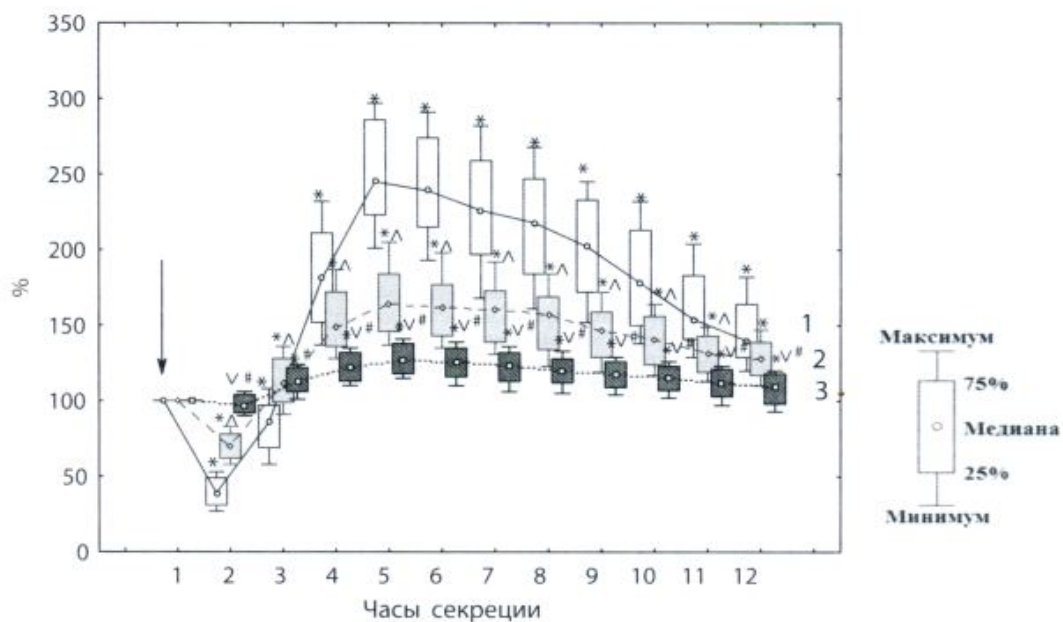


After applying MPG statistically significant ( $p < 0,01$ ) decrease in the severity of pancreatic secretory response compared with groups of 1.1 and 1.2 were observed at the third hour after wedge resection of the duodenal wall and persisted until the end of the observation period. Maximal increase of the flow rates of the investigated parameters in the group of animals using LISP was observed at the end of the fifth or sixth hour surveillance with subsequent reduction in the secretory activity of the pancreas (Fig. 2, 3).

Application of MPG reduced the incidence of UE within 24 hours after the wedge resection duodenal wall to 7.4% to 47% in the control group and 21.6% in the animals using tissue infiltration 0.5% parapancreatic novocaine solution ( $p < 0.05$ ).

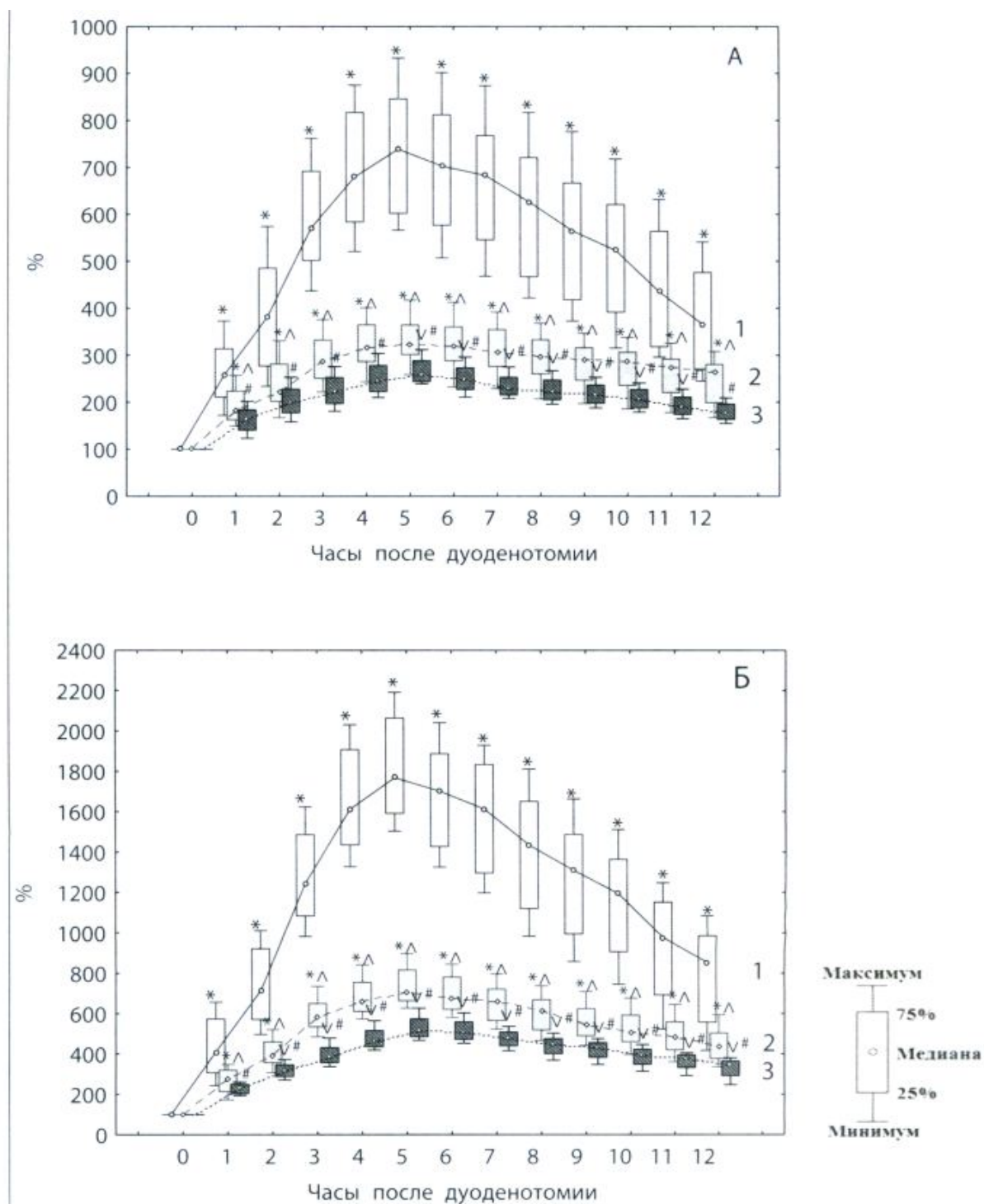


The development of the OP caused a statistically significant ( $p < 0,05$ ) increase in the activity of amylase and lipase in the UK and lymph HLP Group 2.1 and 2.2. Moreover, the enzymatic activity was significantly ( $p < 0,05$ ) higher than thoracic lymph duct in all groups (Fig. 4, 5).



Comparing the enzymatic activity of CK and lymph LLA was not noticed the increase of amylolytic and lipolytic activity in animals who developed the OP after wedge resection of the duodenum, made against the use of MPG. Maximal amylase activity in animals which developed ETA group in the postoperative period indicated 2.3 at the end of the fifth hour and was significantly ( $p < 0,01$  as compared to group 2.1,  $p < 0,05$  compared to group 2.2) than in groups 2.1 and 2.2. From the sixth hour, there was a decrease of amylase activity in the UK and lymph GLP (Fig. 4).

The application result of MPG in dogs after having developed ETA wedge resection duodenal wall also was not noted increasing lipolytic activity expressed IC LLA and lymph was significantly lower compared with the control group of dogs (group 2.1), and a group of 2.2 ( $p < 0,01$  for compared with 2.1,  $p < 0,05$  compared to group 2.2). Lipolytic activity of CK and lymph GLP increased to eight hours of the experiment, followed by reduction to the end of the twelfth hour did not reach statistical significance ( $p > 0,05$ ) compared to 2.2 group, but a highly significant ( $p < 0,01$ ) than in the control group (Fig. 5).



### Discussion of achieved results

Operating injury of KDP lead to damage of the regulatory function of the pancreas and increase of pancreatic exosecretion. One of the possible causes of pancreatic hypersecretion after wedge resection of the duodenum may be a disinhibition of regulatory structures to ensure a stimulating effect on RPE [8, 9]. Furthermore, it is shown that surgical trauma of KDP leads to impaired of intrapancreas blood flow within 15 minutes after duodenotomy [8, 9, 10].

With the development of the OP after wedge resection of the duodenal wall in the first five hours there was a sharp increase in the enzymatic activity of CK and lymph GLP,



morphological signs of acute inflammatory edema. During the fifth and seventh hours after resection of the duodenum, followed by the development of OP was observed relative stabilization of the enzyme activity of CK and lymph GLP followed by a decline. In addition, as has been shown previously [10], the development of the OP for the first four hours of the study indicated an increased tissue pressure in the pancreas, and a moderate increase in production rate of lymph GLP, and from the fifth hour of the experiment reduction of the pressure in the prostate tissue was not noticed, and there was a sharp decrease lymph flow rate until the end of GLP-up period.

Investigation was found that the development OP by applying surgical trauma to duodenal wall pancreatic enzyme activity in lymph GLP significantly exceed the activity of pancreatic enzymes in blood.

Parapancreatic tissue infiltration of 0.5% solution of novocaine before wedge resection of the duodenal wall prevents sudden activation of exosecretion liability after surgery, thereby significantly reducing the amount of pancreatic secretion and increased production rates of the investigated parameters of PES for the entire period of observation compared with wedge resection of isolated duodenal wall, reducing the reaction to the surgery, presumably by reducing the role of the local pathological reflexes ("desreflexogenic effect"). In terms of developed AFP biochemical markers of OP (the activity of pancreatic enzymes in the UK and lymph GLP) were thus much less shown.

Parapancreas microirrigation has had stronger pancreatic protective activity. Thus, there was no inhibition of secretor activity of the pancreas in the first hour after application of KDP surgical trauma and subsequent elevation of RPE indicators during the observation period. The inhibitory effect on pancreatic exosecretion of MPG supposes in a local impact of dalargin having a depressing effect of pancreatic secretion, and a local anesthetic (lidocaine), the impact of which prevented abnormal vasoconstriction and provided "desreflexogenic effect" directly to the pancreas.

Parapancreatic microirrigation found out to be quite effective means of fighting with hyperenzymemia and increase of enzyme lymph activity GLP at OP development after wedge resection of the duodenal wall, suggesting a possible leveling out in these conditions, direct avoidance of pancreatic enzymes in the UK through the microcirculation. The most pronounced effect was observed on the MPG amylolytic activity of CK and lymph GLP. The action on the lipolytic activity of CK and lymph LLA was less strong, but very significant. The degree of decrease in activity of pancreatic enzymes in the UK and lymph GLP parapancreatic micro irrigation after application in the development of PPO was significantly higher than with the infiltration of 0.5% - solution of novocaine parapancreatic tissue.

Thus, the local irrigation of parapancreatic cellular spaces prevents pancreatic exosecretion violation resulting from the development of acute pancreatitis, which makes use of this method in the prevention of acute postoperative pancreatitis pathogenesis justified